Active Project (2016 - 2016)

200W Deep Space CubeSat Composite Beam Roll-Up Solar Array (COBRA), Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)

ABSTRACT

Solar arrays that have very high specific power (W/kg) and compact stowed volume (W/m3), while still providing shielding to the solar cell, are an enabling technology for Deep Space CubeSat missions. Current CubeSat and small satellite solar arrays employ either fixed panels mounted directly to the Satellite side-wall(s) or small hinged rigid panels. These arrays generate very low power (4-20W) due to their limited area available for solar cell installation, thereby constraining CubeSat payload capacity, capability and mission applications. Composite Technology Development, Inc. (CTD) proposes to develop an approach for a high-power, flexible and compact deployable solar array for Deep Space CubeSat Applications. The Composite Beam Roll-up Array (COBRA) is a very high specific power solar array that combines the Photovoltaic Assembly with the deployable boom structure into a unified integrated laminated assembly that can achieve >265 W/kg at the array level, including the deployable structure. The integrated structure will also shield the solar cells from the harsh space environment. The objective of this SBIR is to develop a COBRA for a 6U Spacecraft that generates at least 200W for Deep Space Applications. The unique design is also inherently low cost due to the design simplicity and very low part count. Furthermore, the COBRA technology is highly modular and scale-able, and could be easily scaled to provide in excess of 600W for a small satellite.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: CubeSats' fast time to market and modular architectures open up a new paradigm for NASA scientists and mission planners to consider more cost effective ways to perform a greater variety of science or exploration space missions. Multipoint scientific investigations have been presented in the most recent NASA Roadmap and it

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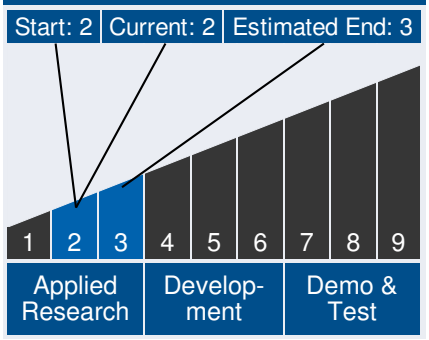
Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

Continued on following page.

is likely that these and other science objectives will be expanded upon in future decadal studies. The high cost of access to space makes deploying constellations of traditional satellites impractical. It is therefore desirable to develop much smaller and lower-cost sensor/satellite systems such that the largest number of distributed measurements can be economically made in the space environment. However, meaningful science investigations will require highly capable CubeSats with attitude determination and control systems, communications systems, data handling subsystems, and scientific payloads, all of which require high levels of power which will be enabled by the proposed technology.

To the commercial space industry:

Potential Non-NASA Commercial Applications: CubeSats are already demonstrating commercial Earth Imaging capabilities. This market will continue to grow as other customers and agencies such as the National Geospatial-Intelligence Agency realize the benefits offered from these CubeSat operators. Other applications in asset tracking and surveillance around the globe can also be performed using CubeSat constellations. In addition, today's armed services are looking for faster / cheaper ways to gain eyes, ears and crosslink communication for the dynamic battlefield. Several CubeSat subsystems are being developed that will drastically improve functionality. However, higher power will be necessary to realize the full capability of these small satellites.

Management Team *(cont.)*

Principal Investigator:
- Dana Turse

Technology Areas

Primary Technology Area:
Materials, Structures, Mechanical Systems and Manufacturing (TA 12)
- Structures (TA 12.2)
  - Lightweight Concepts (TA 12.2.1)

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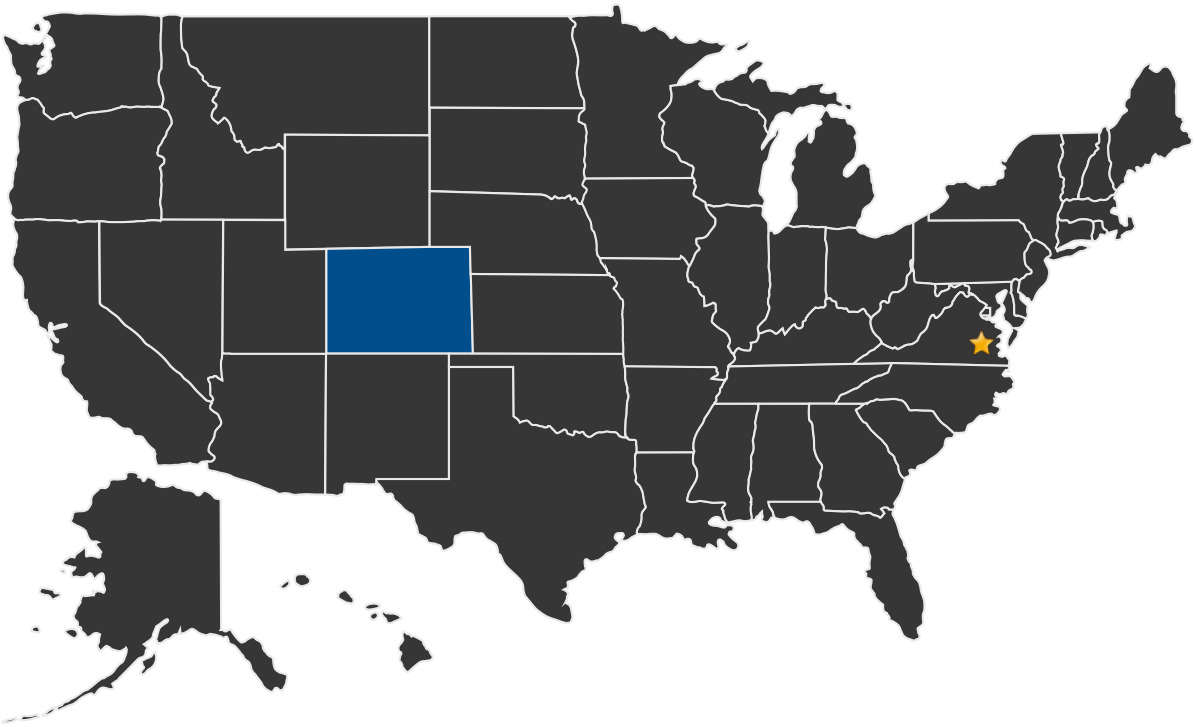
U.S. WORK LOCATIONS AND KEY PARTNERS



U.S. States With Work

Lead Center:
Langley Research Center

Other Organizations Performing Work:

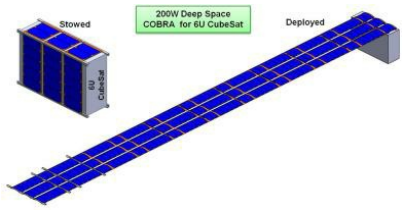
- Composite Technology Development, Inc. (Lafayette, CO)

PROJECT LIBRARY

Presentations

- Briefing Chart
  - (http://techport.nasa.gov:80/file/23363)

IMAGE GALLERY



200W Deep Space CubeSat Composite Beam Roll-Up Solar Array (COBRA), Phase I

DETAILS FOR TECHNOLOGY 1

Technology Title

200W Deep Space CubeSat Composite Beam Roll-Up Solar Array (COBRA), Phase I

Potential Applications

CubeSats' fast time to market and modular architectures open up a new paradigm for NASA scientists and mission planners to consider more cost effective ways to perform a greater variety of science or exploration space missions. Multipoint scientific investigations have been presented in the most recent NASA Roadmap and it is likely that these and other science objectives will be expanded upon in future decadal studies. The high cost of access to space makes deploying constellations of traditional satellites impractical. It is therefore desirable to develop much smaller and lower-cost sensor/satellite systems such that the largest number of distributed measurements can be economically made in the space environment. However, meaningful science investigations will require highly capable CubeSats with attitude determination and control systems, communications systems, data handling subsystems, and scientific payloads, all of which require high levels of power which will be enabled by the proposed technology.